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INTRODUCTION

In prior years those electric utility companies owning generating capacity in the Susquehanna River Basin have submitted Master Siting Study reports to the Susquehanna River Basin Commission (SRBC). The reports described, in a general way, peak load forecasts, existing and planned generation capacity, the water requirements of that capacity, and related matters for the in-basin facilities of the participating companies. The companies refer to themselves as the Susquehanna River Basin Electric Utilities Group ("SRBEUG"). SRBEUG is made up of all of the companies in the PJM Interconnection except Potomac Electric Power Co., plus New York State Electric & Gas (a New York Power Pool member) and West Penn Power (part of the Allegheny Power System).

For some time the members of the Commission have not been satisfied with the scope or detail provided in the Master Siting reports. In January, 1979, the Commissioners adopted a set of revised reporting requirements. Basically, the new requirements call for more detailed information about the current and future operations - capacity, generation, sales - of the SRBEUG companies and the place of the basin facilities in those operations.

In the following sections, the 1978 operations of the SRBEUG companies are drawn together in Tables 1-4. Table 5 gives the 10-year peak load forecast for each company and related information. Table 6 gives the 1978 annual load factor of each company. Estimates of the net export of energy from the basin by the SRBEUG companies are shown in Table 7. Finally, the materials submitted by SRBEUG on planned capacity expansions and their consumptive water requirements are attached. The last section of the report offers some conclusions and recommendations.

CURRENT CONDITIONS

The generating capacity, by types, of each of the dozen utilities owning generating capacity within the basin is shown in Table 1. These data are the summer capacities of units in service on January 1, 1979. (The winter capacity of some units is slightly higher than the summer ratings since they can be operated at somewhat higher temperatures/pressures with the lower ambient temperatures of winter.) Table 2 shows each type of generating capacity located in the basin as a percentage of the total capacity of that type operated by the SRBEUG companies. Together the two tables provide a "snap-shot" at a point in time of the basin's generating capacity and its relation to the total capacity of the companies involved.

The obvious major change in the data that has occurred since their compilation is the loss of the capacity at Three Mile Island (TMI) No. I and No. II. If both these units are removed from the rate base, the loss of their 1,656 MW's would have the following impacts on capacity:

TABLE 1

SUSQUEHANNA RIVER BASIN ELECTRIC UTILITIES GROUP COMPANIES
EXISTING SUMMER GENERATING CAPACITY - (MEGAWATTS AS OF 1-1-79)

	Capacity			Steam Turbine-Fossil Fuel		Steam Turbine-Nuclear		Hydro-Conventional		Hydro-Pumped Storage		Combustion Turbines, Diesels, Etc.	
	Total	In-Basin	Out-Basin	In*	Out*	In	Out	In	Out	In	Out	In	Out
Atlantic City Elec.	1,556	157	1,399	---	933	157	80	---	---	---	---	---	386
Baltimore Gas & Elec.	5,162	152	5,010	---	2,673	---	1,620	152***	---	---	---	---	717
Delmarva Power & Light	2,227	157	2,070	---	1,744	157	80	---	---	---	---	---	246
GPU Companies	7,725	2,483	5,242	639	3,171	1,656**	620	19	45	---	241	169	1,165
Jersey Central	*3,016*	*414*	*2,602*	---	*894*	*414*	*620*	---	---	---	*165*	---	*923*
Met Ed	*2,030*	*987*	*1,043*	---	*915*	*828*	---	*19*	---	---	---	*140*	*128*
Penelec	*2,679*	*1,082*	*1,597*	*639*	*1,362*	*414*	---	---	*45*	---	*76*	*29*	*114*
NY State Elec. & Gas	1,781	291	1,490	291	1,439	---	---	---	38	---	---	---	13
PA Power & Light	6,335	3,788	2,547	3,358	2,339	---	---	178***	44	---	---	252	164
Phila. Elec. Co.	7,691	2,278	5,413	---	3,547	886	460	512	---	880	---	---	1,406
Public Service Elec. & Gas	9,061	886	8,175	---	4,748	886	459	---	---	---	165	---	2,803
UGI - Luzerne Div.	115	46	69	46	69	---	---	---	---	---	---	---	(<1)
West Penn Power	2,991	44	2,947	44	2,895	---	---	---	---	---	52	---	---
TOTALS	44,644	10,282	34,362	4,378	23,558	3,742	3,319	861	127	880	458	421	6,900

---

* In - Capacity Located Within The Basin.
Out - Capacity Located Outside The Basin.

** Three Mile Island Unit No. I : 776 MW
Three Mile Island Unit No. II: 880 MW

*** Includes Company's Share of Safe Harbor Capacity.

Source: MAAC, ECAR, NYPP Reports of April 1, 1979.

TABLE 2

WITHIN-THE-BASIN EXISTING SUMMER CAPACITY AS A PROPORTION OF SRBEUG TOTAL CAPACITY BY TYPES OF GENERATION

Type	Capacity Located Within The Basin (MW)				Capacity Located Outside Basin (MW)	Total Capacity (Within & Outside) (MW)	In-Basin Capacity As % Of Total Capacity
	N.Y.	Pa.	Md.	Total			
Steam Turbine - Fossil Fuel	291	4,087	---	4,378	23,558	27,936	15.7
Steam Turbine - Nuclear	---	3,742	---	3,742	3,319	7,061	53.0
Hydro - Conventional	---	349	512	861	127	988	87.1
Hydro - Pumped Storage	---	880	---	880	458	1,338	65.8
Combustion Turbines, Diesels	---	421	---	421	6,900	7,321	5.8
TOTALS	291	9,479	512	10,282	34,362	44,644	23.0

Source: Table 1 of this report and Figure 4 in Master Siting Study - June, 1977.

Entity	TMI I & II Capacity As A Percentage of Entity Capacity
General Public Utility Total Capacity	21.4
SRBEUG Nuclear Capacity	23.5
SRBEUG In-Basin Capacity	16.0
SRBEUG Total Capacity	3.7

Under the terms of the PJM Agreement, each member has the obligation to install or arrange for sufficient contract capacity to meet its allocated share of the PJM forecast requirement. For several years, General Public Utility (GPU) has been the principal "purchaser" of capacity from other members. (Their payments to other PJM members for these contractual arrangements amounted to $9.57 million in 1977 and $10.42 million in 1978.) Apparently, the capacity at TMI would have made such contractural purchases unnecessary. Now GPU is confronted with not only meeting the capital costs of TMI, but also once again paying for contract capacity and energy purchases from the PJM and elsewhere.

The total capacity of the interconnected systems within which the SRBEUG companies operate is as follows:

N.Y. State Interconnected Systems	29,726 MW
PJM Interconnection	44,963
East Central Area Reliability Interconnection (ECAR) - Bulk power	80,824
	155,513 MW

Further, the New York Power Pool is interconnected with systems in the New England States and provinces of Ontario and

New Brunswick, while PJM and ECAR interconnect with bulk power companies in Virginia and the Carolinas. Thus, the SRBEUG capacity may be supplemented as needed and available through the various interconnection agreements.

Tables 1 and 2 dealt with the capacity to generate electrical energy. Table 3 itemizes the amount of energy produced within the basin. As indicated there, in 1978 the SRBEUG companies obtained 29.2% of their energy from plants located within the basin. The within-basin production ranged from 1% by West Penn Power Co. to nearly 78% by UGI. Pennsylvania Power & Light generated the largest amount of energy in the basin during 1978 - more than 21 billion kilowatthours.

Each SRBEUG company was requested to estimate their within-basin sales by ratepayer group. This information is summarized in Table 4. Four companies - Atlantic City Electric, Delmarva Power & Light, Jersey Central Power & Light, and Public Service Electric & Gas - had no in-basin sales, and less than 1% of the sales of Baltimore Gas & Electric and Philadelphia Electric Company were in the basin. (Referring back to Table 1, it is notable that these six companies own 4,044 MW or 39.3% of the generating capacity located within the basin.) At the other extreme, 100% of UGI's and 64.5% of PP&L's sales were made within the Susquehanna River Basin. Overall, we estimate that 17.8% of the sales of the SRBEUG companies were within the basin. A comparison of Table 4

TABLE 3

TOTAL NET GENERATION & NET GENERATION WITHIN THE BASIN 1978

Company	Total Net Generation* (MWH)	Net Generation in Basin Plant	MWH	Percent of Total Net Generation From Basin Facilities
Atlantic City	5,625,988	Peach Bottom	1,028,212	18.3
Balt. Gas & Elec.	20,245,712	Safe Harbor	404,986	2.0
Delmarva Power & Light	8,177,202	Peach Bottom	1,028,212	12.6
GPU Companies	29,747,464		10,238,426	34.4
Jersey Central	*9,033,513*	*TMI I*	*1,418,404*	*17.6*
		TMI II	*168,036***	
			1,586,440	
Met Ed	*8,390,865*	*TMI I*	*2,836,807*	*36.8*
		TMI II	*9,369*	
		York Haven	*131,211*	
		Combustion Turbines	*114,203*	
			3,091,590	
Penelec	*12,323,086*	*TMI I*	*1,418,405*	*45.1*
		TMI II	*4,687*	
		Shawville	*3,946,808*	
		Williamsburg	*153,054*	
		Combustion Turbines	*28,729*	
		Diesels	*8,713*	
			5,560,396	
NY State Elec. & Gas	9,349,765		1,743,072	18.6
		Goudey	*779,609*	
		Hickling	*544,657*	
		Jennison	*418,806*	
PA Power & Light	31,602,283		21,277,975	67.3
		Brunner Island	*8,960,301*	
		Montrour	*8,991,072*	
		Sunbury	*2,443,284*	
		Holtwood-Steam	*7,515*	
		Holtwood-Hydro	*611,457*	
		Safe Harbor	*202,467*	
		Combustion Turbines	*61,072*	
		Diesels	*807*	
Phila. Elec. Co.	22,835,878		7,049,900	30.9
		Conowingo	*1,700,078*	
		Muddy Run	*-496,768*	
		Peach Bottom	*5,846,590*	
Public Service Elec. & Gas	26,952,081	Peach Bottom	5,817,406	21.6
UGI	386,751	Hunlock	301,472	77.9
West Penn Power	12,718,890	Milesburg	132,128	1.0
TOTALS	167,642,014		49,021,789	29.2

---

* Includes generation by hydroelectric subsidiaries that was reported by the companies as purchased energy.

** Includes 163,352 MWH of test generation.

Source: 1978 Form 1's for the various companies.

TABLE 4

SRBEUG - 1978 SALES
(MILLIONS OF KILOWATTHOURS)

	Sales Within the Basin*							
Company	Residential	Commercial	Industrial	Resale	Other	Total Sales in Basin	Total Sales By Company**	Percentage of Sales in Basin
Atlantic City	-0-	-0-	-0-	-0-	-0-	-0-	5,274.6	-0-
Balt. Gas & Elec.	67.0	23.9	45.6	-0-	-0-	136.5	16,170.2	0.8
Delmarva Power & Light	-0-	-0-	-0-	-0-	-0-	-0-	5,127.7	-0-
GPU Companies	2,670.0	1,770.0	3,640.0	570.0	-0-	8,650.0	31,270.3	27.7
Jersey Central	*-0-*	*-0-*	*-0-*	*-0-*	*-0-*	*-0-*	*12,439.1*	*-0-*
Met Ed	*1,403.0*	*860.0*	*1,775.0*	*260.0*	*-0-*	*4,298.0*	*7,917.1*	*54.3*
Penelec	*1,267.0*	*910.0*	*1,865.0*	*310.0*	*-0-*	*4,352.0*	*10,914.1*	*39.9*
NY State Elec. & Gas	1,466.0	1,219.0	914.0	8.0	465.0	4,072.0	10,514.6	38.7
PA Power & Light	5,158.0	3,614.0	4,628.0	341.0	180.0	13,921.0	21,575.6	64.5
Phila. Elec. Co.	86.0	32.0	52.0	.03	-0-	170.0	27,354.0	0.6
Public Service Elec. & Gas	-0-	-0-	-0-	-0-	-0-	-0-	29,341.9	-0-
UGI - Luzerne Div.	369.5	170.4	76.2	-0-	4.5	620.6	620.6	100.0
West Penn Power	394.1	-- 728.4 --		23.0	2.6	1,148.1	13,781.3	8.3
TOTALS						28,717.6	161,030.8	17.8

---

* Information supplied to SRBC by companies except West Penn. Estimate for West Penn based on 100% of sales in Nittany Division, 30% of sales in Keystone Division, and resale to Alleg. Elec. Coop. at Clearfield and Austin, Pa.

** Form 1's, p. 409, line 12.

with Table 3 indicates that sales within the basin are approximately 59% of the amount of energy generated within the basin.

PROJECTED GROWTH
PEAK LOADS & ENERGY REQUIREMENTS

Ten-year peak load forecasts were obtained for each of the SRBEUG companies except West Penn Power. (In the information obtained, West Penn is subsumed under its holding company, Allegheny Power System.) In addition, we received the forecasts for the East Central Area Reliability Coordination Agreement (ECAR), the Mid-Atlantic Area Council (MAAC), and the New York Power Pool (NYPP). The annual compound rate of growth for each of the available forecasts was computed and is shown with the other forecast information in Table 5. The projected growth rates of the individual companies ranged from 2.4% to 5.6%. We also were supplied estimates of the future loads that will occur in the basin. These estimates together with the proportion of the companies' total loads they represent are included in Table 5.

The industry has moved away from the high rates of load growth forecasted only a few years ago. The 15-year growth rates forecasted in the earlier Master Siting Study reports are as follows:

TABLE 5

SRBEUG COMPANIES
PEAK LOADS, FORECASTED GROWTH RATES & PROPORTION OF PEAK LOADS IN BASIN

Company	Peak Season	Seasonal Peak Load For Total Company (MW) Actual 1978	Seasonal Peak Load For Total Company (MW) Forecasted 1979	Seasonal Peak Load For Total Company (MW) Forecasted 1988	Forecasted Annual Compound Growth Rate (%) For 10 Years Ending 1988	Forecast of Seasonal Peak Load In Basin (MW) 1979	Forecast of Seasonal Peak Load In Basin (MW) 1988	Forecasted In-Basin Load as Percentage of Total Company Load 1979	Forecasted In-Basin Load as Percentage of Total Company Load 1980
Atlantic City	S	1,177	1,318	1,919	5.0	-0-	-0-	--	--
Balt. Gas & Elec.	S	3,750	3,940	5,890	4.6	33	56.8	0.8	1.0
Delmarva Power & Light	S	1,591	1,780	2,740	5.6	-0-	-0-	--	--
GPU Companies	W	5,898	6,035	8,330	3.5	1,775	2,355	28.1	27.5
Jersey Central	*S*	*2,689*	*2,940*	*3,900*	*3.8*	*-0-*	*-0-*	*--*	*--*
Met Ed	*W*	*1,483*	*1,520*	*2,030*	*3.2*	*878*	*1,120*	*55.2*	*53.7*
Penelec	*W*	*1,981*	*2,075*	*3,000*	*4.2*	*897*	*1,235*	*41.1*	*39.7*
NY State Elec. & Gas	W	2,138	2,240	3,260	4.3	778	1,132	34.7	34.7
PA Power & Light	W	4,649	4,790	6,160	2.9	3,120	4,010	65.1	65.1
Phila. Elec. Co.	S	5,655	5,700	7,200	2.4	N/A	N/A	0.64	0.64
Public Service Elec. & Gas	S	6,615	7,120	8,948	3.1	-0-	-0-	--	--
UGI - Luzerne Div.	W	142	155	189	2.9	155	189	100.0	100.0
West Penn Power	W	2,403	N/A	N/A	-	N/A	N/A	6.0	6.0
				Regional Systems Forecasts					
System									
ECAR (Bulk Power)	W	60,021	63,091	94,553	4.6	--	--	--	--
MAAC	S	31,812	33,446	44,006	3.3	--	--	--	--
NYPP	S	20,418	21,430	26,730	2.7	--	--	--	--

S = Annual peak load occurs in summer season.
W = Annual peak load occurs in winter season.
N/A = Information not available in materials supplied.

Report Date	Forecasted Annual Compound Rate of Growth in Summer Peak Load of SRBEUG Companies
March, 1974	6.7%
June, 1975	5.3%
June, 1977	4.5%

Using the MAAC system as a proxy for the SRBEUG companies*, its 10-year forecasted growth rate is down to 3.3%.

The growth rates for the three regional systems shown in Table 5 are interesting. One might speculate that they are inversely related to the level of activity and review by State regulatory agencies in their respective areas. For instance, in New York State the Power Pool forecasts are debated in public hearings by several State agencies and public interest groups who prepare their own forecasts. At the other extreme, ECAR, with 26 bulk power companies operating in all or parts of seven States operates in a setting where no single State or agency is in a position to successfully challenge the reliability of the Pool's forecasts. The debates in New York, the forecasting activities of the Maryland Power Plant Siting Program, and the increasing activities of the Pennsylvania PUC will be watched carefully for possible response by industry. There appears to be a growing concern within State regulatory agencies over premature expansions in generating capacity. Increased activity by these agencies should mean that the SRBC may not have to involve itself directly with the adequacy of the load forecasting methodologies used by the companies.

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* SRBEUG = MAAC/PJM minus Potomac Electric Power plus N.Y. State Electric & Gas and West Penn Power.

LOAD MANAGEMENT VS. CAPACITY INCREASES

Within the industry nationally as well as within the basin, there is growing interest in "conservation and load management" (that is, dampening demand for electricity and altering its time pattern of use) as alternatives to increasing generating capacity. PP&L has announced that its goal is to reduce its average annual compound growth in peak load to 2.5% for the period 1979-1995. The New England Electric System has adopted a plan that seeks to reduce its average annual peak load growth to 1.9% for the period 1980-1995. In reviewing any future applications for water supplies for new thermal generating plants in the basin, the Commission may wish to investigate the extent to which the company has considered the impact of conservation and load management programs on its capacity projections. At the same time it must be remembered that some of the SRBEUG companies, especially those that are net sellers to their interconnections, have high annual load factors. It may be that such companies have less opportunity to implement load management and conservation programs. On the other hand, opportunities may exist to "add" capacity through increasing the load factors of certain companies in the system rather than through construction of new capacity. The annual load factors for 1978 for the various companies are given in Table 6.

TABLE 6

ANNUAL LOAD FACTORS OF SRBEUG COMPANIES - 1978

Company	System Net Input[1] (MWH)	Peak Load (MW)	Annual Load[2] Factor (%)
Atlantic City	5,744,369	1,177	56
Balt. Gas & Elec.	17,194,773	3,553	55
Delmarva	5,462,802	990	63
GPU Companies			
Jersey Central	*13,601,029*	*2,689*	*58*
Met Ed	*8,492,611*	*1,483*	*65*
Penelec	*11,806,863*	*1,993*	*68*
NYSE&G	11,702,928	2,043	65
PP&L	23,340,212	4,431	60
PECO	29,350,783	5,655	59
PSE&G	31,546,632	6,615	54
UGI	666,543	142	54
West Penn	14,810,796	2,403	70

---

[1] Source: 1978 Form 1's, p. 431, Lines 19 + 20 + 28.

[2] Annual Load Factor (%) = $\frac{\text{System Net Input}}{\text{Peak Load} * 8760 \text{ hrs./yr.}} * 100.$

ESTIMATED EXPORT OF ENERGY FROM THE BASIN

This section attempts to estimate the net exports (imports) of electrical energy out of (into) the basin by each of the 12 SRBEUG companies. The information developed in this section is based upon rather broad assumptions (in the face of not having specific data) and so may be of a different order of reliability than the information shown in Tables 1 through 6.

Conceptually, the estimation of exports is straight forward. Gross exports are defined as the difference between the amount of energy produced in the basin and the amount sold there, assuming production is greater than sales. (Imports are "negative" exports, that is, sales in the basin are greater than production.) The estimates of gross exports (imports) are given in Columns 1, 2, and 3 of Table 7. As shown there, gross exports by the SRBEUG companies in 1978 exceeded 20 billion kilowatthours or 41% of the energy produced in the basin. Only Metropolitan Edison Co., New York State Electric & Gas, and West Penn Power were importers of energy on a gross basis.

The gross export estimate can be refined to reflect energy purchased outside the basin for use within the basin. This is done by assuming that all energy purchases are used uniformly across the service area of the purchasing company. We may then allocate the purchases to the basin in the same

TABLE 7

ESTIMATED NET EXPORTS (IMPORTS) OF ENERGY BY SRBEUG COMPANIES
1978

Column:	[(1) -	(2) =	(3)] -	(4) =	(5)
Company	Generation In Basin (GWH)*	Sales In Basin (GWH)*	Gross Exports (Imports) (GWH)*	Adjustment For Purchased Energy Used In Basin (GWH)*	Net Exports (Imports) (GWH)*
Atlantic City	1,028.2	-0-	1,028.2	-0-	1,028.2
Balt. Gas & Elec.	405.0	136.5	268.5		268.5
Delmarva Power & Light	1,028.2	-0-	1,028.2	(0.02)	1,028.2
Jersey Central	1,586.4	-0-	1,586.4	-0-	1,586.4
Met Ed	3,091.6	4,298.0	(1,206.4)	0.07	(1,206.5)
Penelec	5,560.4	4,352.0	1,208.4	9.6	1,198.8
N.Y. State Elec. & Gas	1,743.1	4,072.0	(2,328.9)	1,270.0	(3,598.9)
Pa. Power & Light	21,278.0	13,921.0	7,357.0	0.24	7,356.8
Phila. Elec. Co.	7,049.9	170.0	6,879.9	0.00	6,879.9
Public Service Elec. & Gas	5,817.4	-0-	5,817.4	-0-	5,817.4
UGI	301.5	620.6	(319.1)	441.8	(760.9)
West Penn Power	132.1	1,148.1	(1,016.0)	13.93	(1,029.9)
TOTALS	49,021.8	28,718.2	20,303.6	1,735.6	18,568.0

* Gigawatthours = Millions of Kilowatthours.

proportion that the companies' sales fall in the basin (as shown in Table 4). The adjustment for purchased energy used within the basin is shown in Column 4 of Table 7 as a deduction from gross exports. The purchased energy adjustment amounts to about 1.7 billion kilowatthours, 99% of which is accounted for by the purchases of N.Y. State Electric & Gas and UGI.

The estimates of net exports (imports) made by each company are shown in Column 5 of Table 7. N.Y. State Electric & Gas was the largest net importer while PP&L was the major net exporter. Overall, in 1978 the SRBEUG companies exported an estimated 18.6 billion kilowatthours of energy from the basin, or about 38% of the energy generated there.

For the first time, the Commission has an estimate of the relationship between in-basin energy requirements and energy generation. While this represents an advance in our understanding of the basin relative to the "rest of the world", too much must not be inferred from the estimate of energy exports. The estimate is highly aggregated. More information is needed before we can make inferences about any impacts of the exports. For instance, to assess the net environmental impacts of being an energy exporting area, we would need more detailed information about the imports and exports of energy by type of generating capacity.

FUTURE GENERATION FACILITIES

The request for information to SRBEUG included the following:

> "In lieu of a Master Siting Study report for 1979, we request that each member of SRBEUG submit the following materials relevant to their own operations ...
>
> 6. Estimates of the following ...
>
>   c) With respect to future generating facilities in advanced stages of planning, estimates of water withdrawals and consumptive uses, sources and quantities of inplant uses, plans for make-up of consumptive uses, and the proportion of the energy generated that will be used within the basin.
>
>   d) With respect to the more distant future, indicate the types of plants and the cooling options being considered."

The purposes for requesting the materials specified in 6c) and 6d) were two-fold. First, the consumptive use data are pertinent to our own planning efforts. Second, it was of interest to see to what extent, if any, the early stages of the companies' planning processes addressed the need for make-up of consumptive uses. The entire SRBEUG response is attached as Exhibits 1 and 2. In general, the responses are rather sketchy in the area of planning to meet SRBC make-up requirements. Staff has the following observations on particular points in the Exhibits.

-- In Exhibit 1, the intention of GPU to have a hydroelectric facility in service at Raystown in 1982 is seen as highly optimistic.

-- In Exhibit 2, Item 2, Philadelphia Electric Company indicates that type of fuel, capacity and service date for the Fulton site have not been determined. However, staff is aware that PECO has applied to the Nuclear Regulatory Commission for early site review. The meaning of and reason for such a move is not evident.

-- Exhibit 2, Item 3 refers to the proposed expansion at Safe Harbor. We do not understand why this project is viewed as more remote than the Raystown project.

CONCLUSIONS AND RECOMMENDATIONS

The information assembled in this report indicates that the basin is a major supplier of baseload energy to the area served by the SRBEUG companies and adjacent regions. Twenty-three percent of the companies' generating capacities is located within the basin and 29% of the energy generated in 1978 came from basin sources. Clearly, the natural resource endowment of the basin gives the area a comparative advantage in the production of electrical energy. This is shown by the substantial exports of energy out of the basin. A major part of that natural resource base are the waters of the Susquehanna River.

The growth of energy production, with its accompanying demands on water resources, is in a period of transition. The materials gathered in this report should assist the SRBC staff in better understanding the existing system and provide useful information against which future changes may be assessed. In order to maintain the momentum gained, it is recommended that the Commission members authorize a continuing program of analysis of the basin's electric utilities along the following lines.

1. That estimates of SRBEUG generation, sales, exports and load forecasts be made annually, with separate accounting of in-basin and out-of-basin magnitudes.

2. That the data on in-basin generation capacity be updated annually.

3. That SRBC be advised of planned additions to in-basin generating capacity with their total and consumptive water requirements.

4. That the SRBC staff, through ongoing contact with signatory agency and industry personnel, keep abreast of and, where necessary, comment upon current and proposed load forecasts/forecasting techniques.

5. That SRBC be kept advised of the conservation and load management goals and plans of the SRBEUG members, and of the impact of the plans on projected peak loads and energy production.

6. That the SRBC staff discuss with the SRBEUG WRAC and PAC Chairmen how Items 1-5 above can best be implemented.

A Resolution implementing these recommendations was adopted by the Susquehanna River Basin Commission on February 14, 1980. That Resolution is attached as Exhibit 3.

Exhibit 1

ITEM 6C

Plant Name and Company	Unit No.	In-Service Date	Type of Unit*	Installed Capacity MW	Lifetime Capacity Factor %	Type of Cooling	Total Water Use CFS	Consumptive Water Use CFS Max.	Consumptive Water Use CFS Avg.	Remarks
Scottsville-General Public Utilities System	1	1991	BF	625	80	ECT**	20.7	17.2	14.5	Joint Ownership- Penelec-40% Met-Ed-20% Jersey Central-40%
Hanover - Luzerne Electric Division-UGI	1	1988	AF	300	80	ECT	12.1	6.5	5.6	These units although not authorized at this time are included to represent possible future generation dependent on finalization of long range power supply plans.
	2	1990	AF	300	80	ECT	12.1	6.5	5.6	
Susquehanna-Pennsylvania Power & Light Co.	1	1981	N	1050	70	ECT	43.5	31.9	22.3	Station ownership as tenants in common-Pennsylvania Power & Light Co. (90%) undivided interest and Allegheny Electric Cooperative (10%) undivided interest.
	2	1982	N	1050	70	ECT	43.5	31.9	22.3	
Warrior Ridge (Redevelopment)-General Public Utilities System	1 thru 3	1981	H	1.5	65	None	0	0	0	Owned by Penelec.
Raystown-General Public Utilities System	1	1982	H	30	35	None	0	0	0	Joint Ownership-Penelec-50% Allegheny Electric Cooperative, Inc. -50%.

* BF - Bituminous Fueled Steam Turbine
AF - Anthracite Fueled Steam Turbine
N - Nuclear Fueled Steam Turbine
H - Hydrogeneration

** Evaporative Cooling Tower

Exhibit 2

FEASIBILITY STUDIES IN PROGRESS

1. As the need arises, the General Public Utilities System, either independently or with others, assesses a variety of matters related to the long-range future of the system. In prior public documents, General Public Utilities System has indicated that it is studying the installation of future thermal generating facilities at the existing Portland Station in Northampton County and at sites in Berks County and Clearfield County. Other potential sites, not previously announced to the public or which are currently under feasibility study for siting thermal generating facilities, involve one site in Armstrong County and two sites in Indiana County. Among the aforementioned counties, lands have been acquired and are being held for future utilization at a site near Berne in Berks County and a site near Bradys Bend in Armstrong County. The minimum thermal capacity being contemplated for installation at each of these sites is 625 Mw. The actual amount of capacity that may eventually be installed has yet to be established. Furthermore, the current GPU "Load and Capacity Forecast" indicates the possible construction of three coal units each with a proposed capacity of 625 Mw by the summer of 1993. One or more of these units may be located in Pennsylvania at some of the sites identified in this or previous Master Siting Studies or at sites which may evolve from a siting study currently being conducted by the General Public Utilities System. In addition to this General Public Utilities System siting study, other general screening studies are routinely undertaken by General Public Utilities System which seek to identify potential, future sites for hydroelectric and thermal plants and for reservoirs needed to provide compensation for consumptive use by thermal-electric plants.

2. Philadelphia Electric Company has performed extensive geological site studies at the Fulton Generating Station site on the east bank of the Susquehanna River (Conowingo Pond) in Fulton Township, Lancaster County, Pennsylvania. The two High Temperature Gas-Cooled Reactor units previously planned for this site have been cancelled, but the site will probably be used for a future base load generating station. The type of fuel, generating capacity and service date of such a station have not been determined.

3. Recent studies have indicated the feasibility of expanding the capacity of Safe Harbor Generating Station from 230 Mw to 417 Mw by the addition of 5 hydroelectric units. The current 50-year license from the Federal Energy Regulatory Commission (FERC) for Safe Harbor expires on April 22, 1980. In April, 1977 Safe Harbor Water

Power Corporation submitted an application to FERC for a renewed 50-year operating license including installation of the 5 additional units. The final decision on whether any additions will be made is dependent upon receiving a new long-term license from FERC for the entire Safe Harbor Generating Station.

4. Studies on the feasibility of locating a pumped storage hydroelectric facility in the vicinity of the existing Safe Harbor Hydroelectric Plant are being conducted by the Baltimore Gas and Electric Company. Generating capacity or related service dates are not being determined at this time. Also, general screening studies are continuing which identify potential reservoir locations to provide compensation for consumptive water use in the Susquehanna River Basin.

5. Pennsylvania Power & Light Company is currently conducting a study to evaluate existing thermal plant sites for possible expansion. This study and a recently completed study of its service territory to identify sites for new coal fired plants will serve as a primary basis for selecting future coal fired plant sites.

   Current indications are that one or more prime sites will be in the Susquehanna River Basin territory. The final sites will not be selected for some time since PP&L demand for electricity is not growing as fast as had been previously anticipated. Although PP&L hopes to postpone the need for a new power plant beyond the 1990's, the company is conducting in-house activities in the event a new coal fired plant is needed in the early 1990's.

   PP&L also plans to initiate a low flow augmentation reservoir siting study to meet the potential water needs of new coal fired plant additions. No specific timetable has been set for this activity but it is planned to get this study underway within the next few months. PP&L is also considering a study of potential pumped storage hydro sites within or near its service territory.

6. Pennsylvania Power & Light Company is conducting a feasibility study for possible expansion of the hydropower generating facilities at its existing Holtwood Hydro-Generating Station.

Exhibit 3

RESOLUTION NO. 80-3

A RESOLUTION by the Susquehanna River Basin Commission requiring information about electric generating projects and electric energy use.

WHEREAS, present and future electric generating facilities impact on the water and water related resources of the Susquehanna River Basin; and

WHEREAS, the Commission has responsibility for the immediate and long range development, management, conservation and use of the water and water related resources of the Basin; and

WHEREAS, the Commission has required, from time to time, under Resolution No. 73-15, dated as of September 15, 1973, as superseded by Resolution No. 76-3, dated as of May 13, 1976, Master Siting Study reports from electric utilities with generating facilities in the Basin; and

WHEREAS, the responses to the Commission's requirements for annual reports have not provided the needed information and data to permit the Commission to fulfill its responsibilities; and

WHEREAS, the Commission staff, at the request of the Commission, developed an analysis of electric generation and energy use for 1978 which the Commission has determined to be a desirable and useful analysis in the management of the Basin's water and water related resources;

NOW THEREFORE BE IT RESOLVED THAT:

1. The Commission staff shall undertake a continuing program of analysis of the electric generation and energy use within the Basin and the resultant impacts on the Basin's water and water related resources.

2. By July 1, 1980, initially, and on June 1, 1981, and June 1 of each year thereafter, each Susquehanna River Basin Electric Utilities Group ("SRBEUG") member* shall provide to the Commission staff information, including but not be limited to the following:

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* At the time of adoption of this Resolution, the following companies comprise SRBEUG: Atlantic City Elec. Co., Baltimore Gas & Elec. Co., Delmarva Power & Light Co., Jersey Central Power & Light Co., Luzerne Elec. Division UGI, Met-Ed Co., N.Y. State Elec. & Gas Corp., Pa. Elec. Co., Pa. Power & Light Co., Phila. Elec. Co. and generating subsidiaries, Public Service Elec. & Gas Co., Safe Harbor Water Power Corp., West Penn Power Co., and York Haven Power Co.

Exhibit 3 (Cont'd)

a. A report describing energy generated, in megawatthours, by its generating facilities within the Basin and outside the Basin for the preceding calendar year.

b. Sales of electric energy within the Basin, in megawatthours, by major ratepayer group for the preceding calendar year.

c. The projected peak load forecasts for the ensuing 1-10 years and 11-20 years periods together with an estimate of the percentage of each projected load that occurs in the Basin.

d. For the July, 1980 report and in the future, from time to time as requested, provide a brief description of the conservation and load management plan each SRBEUG member expects to implement together with an estimate of the plans' impacts on future peak loads and energy use over the next 10 to 20 year period.

e. Annual updates of changes in in-basin generation capacity.

f. Estimates of total and consumptive water requirements of any planned additions to in-basin generation capacity.

g. Such other information or reports as the Commission staff shall deem necessary for the purposes of this Resolution.

3. The Commission staff shall, to the extent possible, coordinate such information requests and work through the SRBEUG Water Resources Advisory Committee and/or the SRBEUG Planning Advisory Committee, as appropriate.

4. It is the Commission's intent that staff utilize, to the extent possible, for purposes of developing its analysis, data and information generated by each company to meet the reporting requirements of other agencies.

5. This Resolution shall supersede Commission Resolution No. 76-3 and be effective immediately.

Feb 14, 1980
Date

Maurice K Goddard
Chairman

SUSQUEHANNA RIVER BASIN COMMISSION

ROBERT J. BIELO
EXECUTIVE DIRECTOR

PREPARED BY:

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INTRODUCTION

This report is the second in a series prepared by the SRBC staff and the first prepared in response to Commission Resolution No. 80-3. The previous report,* issued in March 1980, focused on the operations of investor-owned electric utilities having generating facilities in the basin. That report provided information on the generation capacity and energy production within the basin, and the extent to which each of the companies involved relied on that capacity and energy.

This report will focus on three areas. First, the data on generation capacity, energy production, export estimates, and future load growth and capacity expansion contained in the report covering the 1978 calendar year will be updated to 1979. Second, various impacts of the loss of Three Mile Island Units 1 and 2 will be reviewed. Finally, energy conservation and load management techniques will be described and plans for their implementation will be discussed.

CURRENT CONDITIONS

Generating Capacity

The generating capacity of the Susquehanna River Basin Electric Utilities Group (SRBEUG) located within the basin would have remained unchanged from 1978 but for the shutdown of the two units at Three Mile Island. The unavailability of the TMI units is reflected in the information presented in Table 1. The 1980 Mid-

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* SRBC Publication No. 65.

TABLE 1

SUSQUEHANNA RIVER BASIN ELECTRIC UTILITIES GROUP COMPANIES
EXISTING SUMMER GENERATING CAPACITY - (MEGAWATTS AS OF 1-1-80)

	Capacity			Steam Turbine-Fossil Fuel		Steam Turbine-Nuclear		Hydro-Conventional		Hydro-Pumped Storage		Combustion Turbines, Diesels, Etc.	
	Total	In-Basin	Out-Basin	In*	Out*	In	Out	In	Out	In	Out	In	Out
Atlantic City Elec.	1,526	157	1,369	---	903	157	80	---	---	---	---	---	386
Baltimore Gas & Elec.	5,170	152	5,018	---	2,666	---	1,635	152	---	---	---	---	717
Delmarva Power & Light	2,236	157	2,079	---	1,753	157	80	---	---	---	---	---	246
GPU Companies	6,051	827	5,224	639	3,153	---**	620	19	45	---	241	169	1,165
Jersey Central	*2,602*	---	*2,602*	---	*894*	---	*620*	---	---	---	*165*	---	*923*
Met Ed	*1,202*	*159*	*1,043*	---	*915*	---	---	*19*	---	---	---	*140*	*128*
Penelec	*2,247*	*668*	*1,579*	*639*	*1,344*	---	---	---	*45*	---	*76*	*29*	*114*
NY State Elec. & Gas	1,785	291	1,494	291	1,443	---	---	---	38	---	---	---	13
PA Power & Light	6,335	3,788	2,547	3,358	2,339	---	---	178	44	---	---	252	164
Phila. Elec. Co.	7,698	2,278	5,420	---	3,554	886	460	512	---	880	---	---	1,406
Public Service Elec. & Gas	9,023	886	8,137	---	4,748	886	459	---	---	---	165	---	2,765
UGI - Luzerne Div.	115	46	69	46	69	---	---	---	---	---	---	---	(<1)
West Penn Power	3,252	44	3,208	44	3,156	---	---	---	52	---	---	---	---
TOTALS	43,191	8,626	34,565	4,378	23,784	2,086	3,334	861	179	880	406	421	6,862

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* In - Capacity Located Within The Basin.
Out - Capacity Located Outside The Basin.
**The capacity of Three Mile Island Units 1 & 2 is excluded from this table (see text for further explanation).

Source: MAAC, ECAR, NYPP Reports of April 1, 1980 and West Penn Power Co. Form 1 for 1979.

Atlantic Area Council (MAAC) report includes the TMI units as "existing" and does not include them as "inoperable capability," since they did not fully meet the definition of such capacity (personal communication, GPU Service Corp. staff). The TMI units have been excluded from Table 1 of this report on the basis that neither unit was in operation on January 1, 1980, and the decision to return them to operation does not rest solely with the owners.

Aside from the addition of 261 MW of fossil fuel capacity outside the basin by West Penn Power, other changes in Table 1 from the corresponding table in last year's report represent minor reratings and corrections.

Energy Production

Total energy production by the SRBEUG companies together with the energy produced at their facilities located within the basin are presented in Table 2. As expected, the loss of the TMI units is reflected in the substantial decrease in generation by the GPU companies. Their 1979 in-basin production was only 66% of that in 1978, while overall their total generation was down about 10% from 1978.

The tremendous escalation in fuel oil prices that occurred in 1979 is apparent in the total generation of certain of the companies. Those companies having substantial coal-fired capacity - N.Y. State Electric & Gas, Pa. Power & Light, and West Penn Power - all increased their total net generation over what they produced in 1978 while the companies with substantial oil-fired capacity - Baltimore Gas & Electric, Philadelphia Electric

TABLE 2

TOTAL NET GENERATION & NET GENERATION WITHIN THE BASIN 1979

Company	Total Net Generation* (MWH)	Net Generation in Basin		Percent of Total Net Generation From Basin Facilities
		Plant	MWH	
Atlantic City	5,397,338	Peach Bottom	1,096,490	20.3
Balt. Gas & Elec.	19,825,394	Safe Harbor	706,150	3.6
Delmarva Power & Light	8,772,683	Peach Bottom	1,096,490	12.5
GPU Companies	26,891,395		6,741,419	25.1
Jersey Central	*8,582,152*	*TMI I*	*212,007*	*6.1*
		TMI II	*312,975*	
			524,982	
Met Ed	*5,433,929*	*TMI I*	*424,019*	*22.9*
		TMI II	*625,944*	
		York Haven	*147,069*	
		Combustion Turbines	*49,018*	
			1,246,050	
Penelec	*12,875,314*	*TMI I*	*212,012*	*38.6*
		TMI II	*312,969*	
		Shawville	*4,149,227*	
		Williamsburg	*221,332*	
		Combustion Turbines	*70,846*	
		Diesels	*4,001*	
			4,970,387	
NY State Elec. & Gas	10,430,061		1,761,706	16.9
		Goudy	*835,388*	
		Hickling	*496,132*	
		Jennison	*430,186*	
PA Power & Light	33,452,572		24,146,961	72.2
		Brunner Island	*9,595,481*	
		Montour	*10,389,678*	
		Sunbury	*2,566,019*	
		Holtwood-Steam	*527,136*	
		Holtwood-Hydro	*696,334*	
		Safe Harbor	*353,070*	
		Combustion Turbines	*18,516*	
		Diesels	*727*	
Phila. Elec. Co.	20,312,692		7,794,597	38.4
		Conowingo	*2,136,280*	
		Muddy Run	*-577,555*	
		Peach Bottom	*6,235,872*	
Public Service Elec. & Gas	24,746,562	Peach Bottom	6,203,707	25.1
UGI	364,422	Hunlock	293,034	80.4
West Penn Power	16,270,402	Milesburg	23,714	0.1
TOTALS	166,463,521		49,864,268	30.0

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* Includes generation by hydroelectric subsidiaries that was reported by the companies as purchased energy.

Source: 1979 Form 1's for the various companies.

Co., and Public Service Electric & Gas - showed decreases. In-basin capacity relying on fossil fuels is predominantly coal-fired. The major exception, West Penn's Milesburg plant, produced only 18% as much energy in 1979 as it did in 1978.

Overall, total net energy production by the SRBEUG companies was down 1.2 billion kilowatthours from 1978, a decline of less than 1%. In-basin production increased more than 842 million kilowatthours, an increase of nearly 2%.

Pa. Power & Light (PP&L) continues to lead all of the SRBEUG companies in terms of total energy generated, energy generated within the basin, and percentage of total production from facilities located within the basin.

Comparisons With the U.S. Electric Utility Industry

This year information has been obtained that permits comparison of the magnitude of SRBEUG total and in-basin net generation* and installed generating capacity with comparable values for the entire nation. The national values are for the total electric utility industry in the U.S. - privately, publicly, and cooperatively owned. The private sector constitutes the major part of the industry, having 76% of the installed capacity and generating 78% of the energy nationwide in 1979.

The SRBEUG companies, all of which are investor-owned utilities, produced 7.4% of the nation's net energy, utilizing 7.2% of the country's installed capacity. Of special interest is the relationship of generating capacity and net generation occurring within the Susquehanna River Basin relative to the national totals. In 1979 2.2% of the national net energy production came from the basin. One and four tenths percent of the nation's total installed capacity was located within the basin.

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* Net generation is defined as total energy generated less the energy used for pumped storage.

The detailed information, from which the percentages mentioned above were derived, are given in Table 3.

Energy Sales

Each SRBEUG company was requested to provide estimates of their sales of electric energy within the basin. This information is summarized in Table 4. As was the case for 1978, four companies - Atlantic City Electric, Delmarva Power & Light, Jersey Central Power & Light, and Public Service Electric & Gas - had no sales within the basin, and less than 1% of the sales of Baltimore Gas & Electric and Philadelphia Electric Co. were in the basin. At the other extreme, 100% of UGI's and 64.6% of PP&L's sales were made within the basin. Sales within the basin increased by an estimated 1,200 gigawatthours (millions of kilowatthours) or 4% over 1978 while total sales were up 7,387 GWH or 4.6%. The percentage of total sales that occurred within the basin, 17.8%, was unchanged from a year ago. Sales within the basin equalled 60% of the energy generated there, up slightly from 1978.

TABLE 3

COMPARISON OF SRBEUG INSTALLED CAPACITY & NET ENERGY PRODUCTION WITH U.S. TOTALS

	1979 Installed Capacity (Megawatts)	1979 Net Generation (Millions of Kilowatthours)
SRBEUG Companies - Total	43,191	166,463
SRBEUG Companies - In-basin	8,626	49,864
U.S. Electric Utility Industry - Total	598,298	2,247,372
U.S. Electric Utilities - Private Sector (Classes A & B)	456,495	1,755,699

Sources: SRBEUG Companies: Tables 1 & 2, this report. U.S. Totals: Tables 10, 11, 12, "Statistics of Privately Owned Electric Utilities in the United States - 1979," Publication DOE/EIA-0044(79), Energy Information Administration, U.S. Dept. of Energy, October 1980.

TABLE 4

SRBEUG - 1979 SALES
(MILLIONS OF KILOWATTHOURS)

	Sales Within the Basin*							
Company	Residential	Commercial	Industrial	Resale	Other	Total Sales in Basin	Total Sales By Company**	Percentage of Sales in Basin
Atlantic City	-0-	-0-	-0-	-0-	-0-	-0-	5,308.2	-0-
Balt. Gas & Elec.	67.0	2.7	49.5	-0-	-0-	145.5	16,823.2	0.9
Delmarva Power & Light	-0-	-0-	-0-	-0-	-0-	-0-	7,491.8	-0-
GPU Companies	2,645.0	1,795.0	3,818.0	575.0	325.0	9,158.0	31,995.5	28.6
Jersey Central	*-0-*	*-0-*	*-0-*	*-0-*	*-0-*	*-0-*	*12,771.0*	*-0-*
Met Ed	*1,395.0*	*860.0*	*1,870.0*	*270.0*	*135.0*	*4,530.0*	*8,084.0*	*56.0*
Penelec	*1,250.0*	*935.0*	*1,948.0*	*305.0*	*190.0*	*4,628.0*	*11,140.5*	*41.5*
NY State Elec. & Gas	1,477.0	1,235.0	988.0	3.0	505.0	4,208.0	10,789.0	39.0
PA Power & Light	5,368.0	3,717.0	4,778.0	351.0	176.0	14,390.0	22,281.3	64.6
Phila. Elec. Co.	92.1	34.4	74.6	-0-	-	203.1	27,559.7	0.7
Public Service Elec. & Gas	-0-	-0-	-0-	-0-	-0-	-0-	29,587.3	-0-
UGI - Luzerne Div.	372.8	142.6	112.5	-0-	4.9	632.8	632.8	100.0
West Penn Power	393.9	328.0	427.0	25.4	3.8	1,178.1	15,949.4	7.4
TOTALS						29,915.5	168,418.2	17.8

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* Information supplied to SRBC by companies except West Penn. Estimate for West Penn based on 100% of sales in Nittany Division, 30% of sales in Keystone Division, and resale to Alleg. Elec. Coop. at Clearfield and Austin, Pa.

** Form 1's, p. 409, line 12.

Estimated Export of Energy From the Basin

Table 5 summarizes our effort to estimate the net exports (imports) of electrical energy out of (into) the basin by the 12 SRBEUG companies.

As indicated in Columns 1, 2 and 3 of the table, gross exports (imports) are defined as the difference between the amount of energy produced in the basin and the amount sold there. If production is greater than sales, there is an export; if sales exceed production, there is an import.

Metropolitan Edison, N.Y. State Electric & Gas, UGI-Luzerne Division, and West Penn were importers on a gross basis. Gross exports were nearly 20 billion kilowatthours, or about 40% of the energy produced in the basin.

Net exports (imports) are obtained by adjusting the gross figures for energy purchased outside of the basin for use within the basin. This is done by assuming that purchases are used uniformly across the service area of a company, and allocating purchases to the basin in the same proportion that a company's sales occur in the basin. The adjustment for purchases (Column 4) amounted to 4.8 billion kilowatthours. The GPU companies made 32% of the purchases and 57% were made by N.Y. State Electric & Gas. The GPU purchases, undoubtedly related to the loss of TMI, were 158 times their magnitude in the preceeding year. N.Y. State Electric & Gas purchases were more than double what they had been in 1978.

TABLE 5

ESTIMATED NET EXPORTS (IMPORTS) OF ENERGY BY SRBEUG COMPANIES 1979

Column:	[(1)	− (2)	= (3)]	− (4)	= (5)
Company	Generation In Basin (GWH)*	Sales In Basin (GWH)*	Gross Exports (Imports) (GWH)*	Adjustment For Purchased Energy Used In Basin (GWH)*	Net Exports (Imports) (GWH)*
Atlantic City	1,096.5	-0-	1,096.5	-0-	1,096.5
Balt. Gas & Elec.	706.2	145.5	560.7	-0-	560.7
Delmarva Power & Light	1,096.5	-0-	1,096.5	-0-	1,096.5
Jersey Central	525.0	-0-	525.0	-0-	525.0
Met Ed	1,246.0	4,530.0	(3,284.0)	1,117.3	(4,401.3)
Penelec	4,970.4	4,628.0	342.4	417.3	(74.9)
N.Y. State Elec. & Gas	1,761.7	4,208.0	(2,446.3)	2,764.6	(5,210.9)
Pa. Power & Light	24,147.0	14,390.0	9,757.0	0.23	9,756.8
Phila. Elec. Co.	7,794.6	203.1	7,591.6	-0-	7,591.6
Public Service Elec. & Gas	6,203.7	-0-	6,203.7	-0-	6,203.7
UGI	293.0	632.8	(339.8)	468.4	(808.2)
West Penn Power	23.7	1,178.1	(1,154.4)	46.4	(1,200.8)
TOTALS	49,864.3	29,915.5	19,948.9	4,814.2	15,134.7

* Gigawatthours = Millions of Kilowatthours.

The estimates of net exports (imports) are shown in Column 5 of Table 5. N.Y. State Electric & Gas continues to be the major importer and PP&L the largest exporter. Overall, the SRBEUG companies exported an estimated 15.1 billion kilowatthours of energy from the basin in 1979, down by 3.4 billion KWH from 1978. The 1979 exports were equivalent to 30% of the energy generated in the basin.

PROJECTED PEAK LOAD GROWTH

Actual peak load data together with 15 year load forecasts for each SRBEUG company have been compiled in Table 6 together with projected peak loads within the basin. The seasonality designations used in the table follow the industry practice of designating the "winter" season as the period October of the year in question through the following March. Since winter peak loads usually occur in the months of January or February, this means that the winter peaks shown in Table 6 occurred in early 1980, not in 1979.

The dampening effect of higher energy costs is evident in both the actual and the projected loads. Of the 12 SRBEUG companies included in Table 6, seven had lower peak loads in 1979 than in 1978. The remaining five companies had increases ranging from 0.4% to 1.9%. The annual compound growth rate of the 15 year forecasts shown in Table 6 ranged from 1.8% to 4.3%, and were distributed as follows:

TABLE 6

SRBEUG COMPANIES
PEAK LOADS, FORECASTED GROWTH RATES & PROPORTION OF PEAK LOADS IN BASIN

Company	Peak Season	Seasonal Peak Load For Total Company (MW) Actual 1978	1979	Forecasted 1980	1994	Forecasted Annual Compound Growth Rate (%) For 15 Years Ending 1994[1]	Forecast of Seasonal Peak Load In Basin (MW) 1980	1994
Atlantic City	S	1,177	1,193	1,320	1,970	3.4	-0-	-0-
Balt. Gas & Elec.	S	3,553	3,621	3,800	6,110	3.6	27.6	45.0
Delmarva Power & Light[2]	S	1,591	1,501	1,730	2,820	4.3	-0-	-0-
GPU Companies								
Jersey Central	*S*	*2,689*	*2,700*	*2,950*	*4,160*	*2.9*	*-0-*	*-0-*
Met Ed	*W/S*	*1,571*	*1,503*	*1,600*	*2,140*[3]	*2.4*	*895*	*1,200*[3]
Penelec	*W*	*2,124*	*2,072*	*2,200*	*3,140*	*2.8*	*880*	*1,255*
NY State Elec. & Gas	W	2,118	2,072	2,260	3,620	3.8	785	1,253
PA Power & Light[4]	W	4,649	4,400	4,890	6,900	3.0	3,180	6,550
Phila. Elec. Co.	S/W	5,655	5,627	5,800	7,350[5]	1.8	46	60
Public Service Elec. & Gas	S	6,615	6,736	7,118	10,086	2.7	-0-	-0-
UGI	W	[illegible]	[illegible]	[illegible]	215	3.9	137	245
West Penn Power	W	2,562	N/A	N/A	N/A	-	N/A	N/A
	(S)[6]	2,243	2,202	2,220	3,730	3.6	133	224

S = Annual peak load occurs in summer season.
W = Annual peak load occurs in winter season.
N/A = Information not available in materials supplied.

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[1] Computed from the 1979 actual peak load as the base.
[2] Data are for the Delmarva System, including the Maryland & Virginia subsidiaries.
[3] Summer Peak - GPU forecasts Met Ed to become a summer-peaking company in 1992.
[4] Excludes sales to UGI - Luzerne.
[5] Winter Peak - Peak load forecast indicates PECo will become a winter-peaking company in 1993.
[6] Although West Penn Power & APS are winter-peaking entities, the forecast materials supplied were for summer peaks.

Range of Annual Compound Growth Rates Forecasted	No. of Companies
4.0% or higher	1
3.0-3.9%	6
2.0-2.9%	4
Less than 2%	1

A constant revision downward of forecasted peaks has occurred over the past several years for most companies and the regional reliability councils. Given that most companies in the area have only recently begun to give serious consideration to energy conservation and load management techniques, it is probable that the downward trend has not yet bottomed out. This trend has major implications for the scheduling of additional capacity. Capacity additions are discussed in the next section.

FUTURE ADDITIONS & REMOVALS OF GENERATION CAPACITY

No planned new facilities have been added to those mentioned in last year's report. In fact, the general trend is for delays in the expected in-service dates for the various units. Such scheduling adjustments appear the result of several factors, including substantial existing generating capacity reserves, regulatory approval delays and financial limitations. Specific information follows:

-- Scottsville-GPU. 625 MW coal-fired plant. In-service date delayed from 1991 to 1994.

-- Susquehanna Nuclear Power Station. Ownership: PP&L (90%) and Allegheny Electric Coop. (10%). In-service dates of Units 1 and 2 delayed six months to June 1982 and

June 1983 respectively. Atlantic City Electric Co. has purchased 6% of the plant's output until 1991.

- Hanover-UGI. Two 300 MW coal-fired units 1988-1990. Not authorized, but included as representative of possible future supply needs.
- Unidentified Station-Philadelphia Electric Co. 1,100 MW plant in the Lower Susquehanna River subbasin. Location and type of unit has not been determined. In-service date of 1994.
- Safe Harbor (Expansion)-Baltimore Gas & Electric, 125 MW, and Pa. Power & Light 63 MW. In-service date of September, 1985.
- Milesburg, West Penn Power. 44 MW oil-fired plant. This is the only plant West Penn Power, or its parent company, Allegheny Power System, has in the basin. The plant may be retired in the late 1980's or early 1990's.
- Williamsburg, Penelec. 33 MW coal-fired plant. The retirement of this plant has been delayed from 1984 to 1993. Postponements of retirement of about 10 years have been made for other GPU plants in and outside of the basin.
- Warrior Ridge (Redevelopment), Penelec. 1.5 MW hydro facility is expected to be in-service in mid-1981.
- Raystown, Penelec & Allegheny Electric Cooperative. 20 MW hydro project is scheduled to be in-service by mid-1983.

-- Pa. Power & Light tentatively plans to retire all of its combustion turbine capacity (inside and outside the basin) during the period 1987-91, depending upon future economic, environmental and reliability considerations.

-- Philadelphia Electric Co. plans retirement of more than 2,000 MW of older oil and coal-fired capacity in the period 1985-96, assuming the Limerick Nuclear Units come into service in 1985 and 1987.

-- Goudy Unit #7, N.Y. State Electric & Gas. 44 MW of coal-fired capacity is scheduled for retirement by the end of 1990.

-- Jennison Unit #1, N.Y. State Electric & Gas. 35 MW of coal-fired capacity is scheduled for retirement by the end of 1991.

Two companies, N.Y. State Electric & Gas and West Penn Power Co., state that no additional generating capacity is planned within the basin for the foreseeable future.

Generation planning and capacity additions in the State of New York now must comply with the State Energy Master Plan and Long-Range Electric & Gas Report. The Final Report, adopted in March, 1980 projects energy sales to grow at an annual rate of 2.1% for the 15 years ending 1994, with statewide peak loads increasing at an annual rate of 1.8-1.9% for the same period. In order to achieve one of the major goals of the plan, namely, reduction of the State's dependency on petroleum products while expanding generation capacity, the report calls for: a) limiting additional nuclear plants to those under construction; b) converting 6,000 MW of oil-fired capacity to coal; c) increasing imports of hydropower from Quebec; d) developing additional capacity using solid waste, small hydro, and cogeneration; and e) constructing new coal-fired plants.

N.Y. State Electric & Gas (NYSE&G) energy sales and peak demand growth rates exceed those of the entire State. Energy demands are expected to grow by 3% annually, summer peaks by 2.8%, and winter peaks by 2.7% according to the Master Plan Report. The N.Y. Power Pool report, submitted to the State Energy Office under Section 5-112 of the Energy Law, indicates the following NYSE&G capacity additions during the planning period:

a) Eighteen percent of a 1,080 MW nuclear plant under construction at Nine Mile Point on Lake Ontario. In-service date of November, 1986.

b) Somerset, Niagra County. 850 MW coal-fired plant under construction. In-service date of November, 1984.

c) Fifty percent of a planned 800 MW coal-fired plant. In-service date of May, 1989. (Location preferred by company in Article VIII proceedings of the NYS Public Service Commission is Jamesport, Long Island.)

d) Small hydro-several sites. 24 MW of capacity in-service by November, 1982.

It does not appear that any of this capacity lies in the basin, with the possible exception of some of the small hydro.

The existence of the N.Y. State Master Plan and Report means that capacity additions and siting decisions will be under closer scrutiny by the State than previously was the case. At the present it appears that no major capacity additions will be within the basin in New York. At the same time, Commission staff must be alert for public hearings and other proceedings relating to updating of the Plan or the Report that may impact upon the water resources of the Susquehanna Basin.

SOME IMPACTS OF THE THREE MILE ISLAND ACCIDENT

This discussion will be limited to noting how the GPU companies dealt with the lost energy production and generating capacity together with the impacts on other bulk generation companies that can be gleaned from the Form 1's.

Metropolitan Edison Co. (Met-Ed), which owns 50% of the TMI capacity, bore the brunt of the losses, while the Pa. Electric Co. (Penelec), with its substantial fossil-fuel base load capacity, was least affected. Jersey Central Power & Light Co. (J.C.) fell in an intermediate position. For example, the changes in net generation between 1978 and 1979 for the three companies were as follows:

	Change in 1979 Generation From 1978 Production	
	MWH	%
Met-Ed	-2,972,794	-36.0
Jersey Central	-451,361	-5.0
Penelec	+552,228	+4.5
Total	-2,871,927	-9.7%

Each of the companies followed somewhat different courses in dealing with the changes that occurred in their energy production.

Jersey Central, a major net purchaser from the PJM Interconnection, reduced its receipts of energy from nonassociated utilities in the PJM by 353,000 MWH or about 12% less than 1978. This reduction plus the reduced generation was offset by direct purchases of power obtained through short-term power reserve agreements, primarily with the Allegheny Power System (APS). (The energy Jersey Central obtained through the PJM cost, on the average, 3.56 cents per KWH while the short-term purchases cost an average of 2.96 cents per KWH, with those from APS costing 2.83 cents.)

Met-Ed took 296,225 MWH more energy from nonassociated PJM companies in 1979 than in 1978. That energy from the PJM cost 4.32 cents per KWH. Met-Ed made up the bulk of its lost generation through purchase arrangements with other companies. The average price paid for this energy was 3.0 cents per KWH. Seventy percent of these purchases came from APS at a cost per KWH of 2.83 cents.

Penelec decreased its PJM transactions by twelvefold over 1978 while increasing the energy it interchanged with its sister companies by 68% or 733,500 MWH. At the same time Penelec purchased 1.1 million MWH at an average cost of 2.94 cents per KWH, 70% of which came from APS at 2.83 cents per KWH.

The enormity of the financial problems facing the GPU companies is suggested by the following data:

Company	Change in 1979 From 1978 Net Income	 Misc. Deferred Debt
Jersey Central	-($ 6,108,863)	+$ 37,422,235
Met-Ed	-($33,733,168)	+$ 94,303,822
Penelec	+ $ 1,601,725	+$ 10,488,214
Totals	-($38,240,306)	+$142,214,271

APS provided the GPU companies with more than 3 million MWH of energy, of which 1.4 million MWH came from West Penn Power. West Penn's operations changed dramatically in 1979 as contrasted with 1978. Net generation increased by 3.55 million MWH, purchased power increased by over 460,000 MWH while receipts of energy from interchange decreased 1.8 million MWH, for an increase in the net energy to be accounted of 2.2 million MWH. West Penn's annual load factor increased by at least 5%.

LOAD MANAGEMENT & ENERGY CONSERVATION

This section describes some of the approaches for decreasing the rate of growth in electric power use currently under consideration by the electric utilities and public regulatory bodies. Electric energy conservation and load management are not direct regulatory concerns of the SRBC. However, to the extent that they are successful, such efforts reduce the need for additional generating capacity, and, in many instances, the need for cooling water. Thus, the Commission does have an interest in the impacts of conservation efforts planned or underway.

The terms "conservation" and "load management" do not have commonly agreed upon definitions within the industry. For example, conservation is equated in some instances with reduced energy usage, and with increased efficiency of use in others.

The New England Electric System in its recently announced 15-year plan (NEESPLAN 1980-1995) offers practical definitions which will be followed here. The NEESPLAN states:

> "Conservation is defined as an action or actions taken by electric customers to reduce their overall use of electric energy.
>
> "Load management refers to an action or actions taken by either the customer or the electric utility or both to reduce customer demand during the periods of peak demand by shifting electric use to off-peak periods."

The primary focus of conservation, then, is on the demand side, while load management focuses on the supply side. The definition of load management implicitly includes the notion of increasing the annual system load factor.

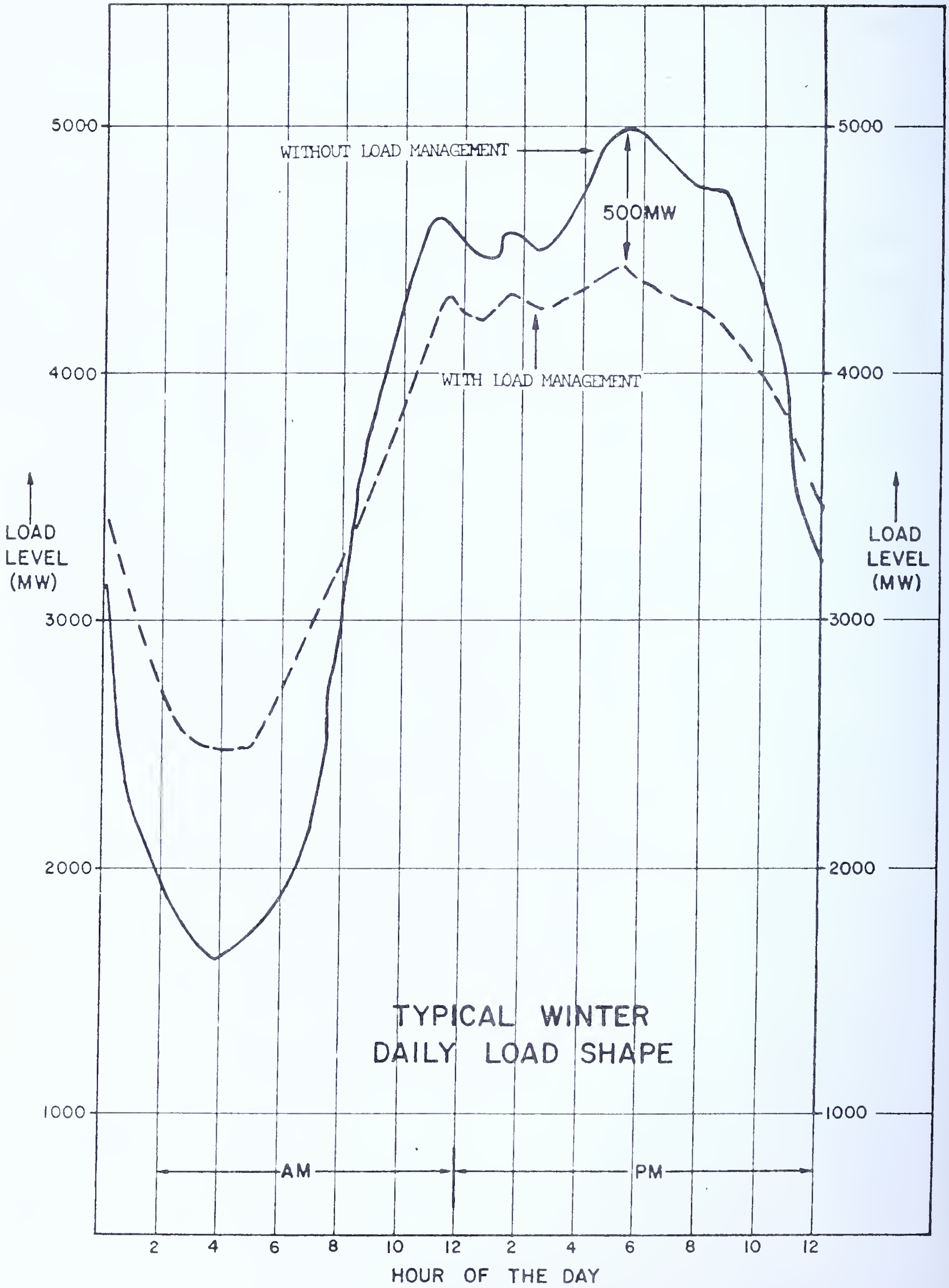
The opportunities for conservation have not yet been fully exploited. They include such items as reduced thermostat settings, increased insulation, especially in new construction, and greater utilization of wood stoves, pricing mechanisms that reduce rather than shift consumption, e.g., seasonal pricing, solar water heating and other solar applications.

Many different schemes can be used for load management. Both daily peaks and seasonal peaks offer opportunities for load shifting, with major emphasis on shifting loads from peak daytime hours to off-peak nighttime hours. This type of load shifting, in which the peak of the load curve is flattened and the "valleys" filled in is sometimes referred to as "load shaping" or "load smoothing". The concept is illustrated in Figure 1, taken from the NEESPLAN.

Load management is being approached from two different but complimentary ways. The first involves alterations in the rate structure so as to induce the consumer to shift his use to the off-peak period. (Increases in rates will also have a conservation effect to the extent that customers reduce their usage in the face of higher prices.) The second utilizes remote control of certain segments of the load.

Load management schemes based on rate structure frequently use some form of "time of day" pricing. Given a daily load curve of the type shown in Figure 1, the idea is to charge high unit prices during the "peak" hours and low prices during the "off-peak" hours (as opposed to the more common practice of charging the same rate around the clock.) The underlying rationale is that generating capacity for peak hours generally is expensive to operate, and those who use it should bear the cost. At the

FIGURE 1


5000
4000
3000
2000
1000
5000
4000
3000
2000
1000
LOAD LEVEL (MW)
LOAD LEVEL (MW)
WITHOUT LOAD MANAGEMENT
500MW
WITH LOAD MANAGEMENT
TYPICAL WINTER DAILY LOAD SHAPE
AM
PM
2
4
6
8
10
12
2
4
6
8
10
12
HOUR OF THE DAY

same time, those who can switch their use to an off-peak period are given an incentive to do so. Generally, plans of this sort require special meters that can record energy use during the two time periods. Such meters are more expensive than the regular kilowatthour recording meter found in most homes. The additional cost of metering is an important consideration in deciding which "size" of residential customer should come under such a rate structure.

Time of day pricing of some form has been used on a limited basis in this country. However, it has been used extensively in certain parts of Europe since the 1950's. This type of pricing is not without problems. In some instances new peaks are created early in the off-peak period. However, the technology exists to deal with problems of this sort.

When there is a strong seasonal component to the peak loads, seasonal pricing is another option. For example, a strongly summer peaking company in a summer peaking power pool may charge prices higher than its comparable year-round flat rate in the summer, and lower prices in the off-peak season. Here the intention is to induce the consumer to reduce consumption, and, thus reduce the load, rather than shifting any of the load. In reality this pricing mechanism is a conservation measure. Note also that it can be put in place using the regular residential kilowatthour meter.

The second set of load management tools available to the industry includes a number of mechanical or electronic timing and remote control devices. The most common is the control of water heaters, either through time switches that turn off one of the heating elements during the peak hours of the day, or radio controlled remote switching which can instantaneously switch one heating element off. The major user in this country of remote control of water heaters is Detroit Edison Co. which has 200,000 units under radio control. It uses its system to cycle heaters on and off to achieve about 100 MW of load flexibility. In an emergency, it can shed 200 MW of load. Buckeye Power of Columbus, Ohio has about 40,000 units of this sort. It uses its system to shed the water heating load when its system load reaches a predetermined level. While both these systems use radio signals, other systems use power lines or telephone lines for transmitting the switching signal.

Timed switching of water heaters has been used in this country for many years. Kentucky Utilities has 35,000 units on this type of system and New England Electric has about 129,000 under clock control. About 50,000 of the New England units are on dual registering meters, and the customers can take advantage of off-peak rates.

Remote control of industrial, commercial and residential central air conditioning is in use or planned in many parts of the country. Under this system, the individual compressor is cycled on and off, typically at 15-minute intervals, during the peak hours of the day. In this way, the utility can "shave" load from its peak. The obvious next step, still experimental in nature, is "cold storage", i.e., ice making or water chilling during off-peak periods with the ice or cold water used as the coolant during the peak period. This sort of load management system not only reduces the peaks but also fills the "valleys" of the load curve.

Heat storage systems analogous to the cold storage system mentioned above have been used in Europe for a number of years but are still under study in this country to adapt them to the typically larger U.S. home. Heat storage is accomplished by using electric energy to heat a large reservoir of water or other liquid, or a bank of ceramic material or bed of stones during the off-peak hours. The stored thermal energy is used to warm the building during the peak period.

Oversize residential hot water heaters, well insulated, and with sufficient capacity for a day's normal hot water requirement are being tested in this country. Since they operate only during off-peak hours, they also may be viewed as having energy storage capacity.

Finally, interlocks which prohibit certain major home appliances, e.g., water heaters, electric ranges, electric clothes dryers, from operating simultaneously are being tested. Consumers would not be inclined to accept them where a declining block rate structure is in effect. However, they have been effective where customers are subject to a demand charge (kilowatts) as well as an energy charge (kilowatthours).

The SRBEUG companies vary widely in the conservation and load management programs they have in place or under active consideration.

All summer peaking PJM members offer seasonal peak load pricing in some form, i.e., charge higher rates during the summer months. Seasonal pricing attempts to dampen demand by imposing higher unit charges during the peak use season.

All of the SRBEUG members appear to offer some or all of the following conservation efforts:

a) Public media programs stressing energy savings through better insulation, caulking, etc.

b) Training teachers to present energy savings information programs in schools.

c) Direct presentations to school children.

d) Direct presentations to various groups of consumers.

e) Detailed home audits of energy savings possibilities in the home. (There may or may not be a fee for the audit.)

f) Help homeowners properly size new or replacement heating and cooling equipment for their home.

g) Conduct workshops for homebuilders and architects on energy saving opportunities.

h) Work with commercial and industrial clients on energy savings possibilities in the heating, lighting, and operation of the clients' facilities.

i) Seek out all possible ways of reducing energy use in their own offices, plants and other facilities.

Time of day pricing currently is available to residential customers by the GPU companies, N.Y. State Electric & Gas, Public Service Electric & Gas, and UGI-Luzerne Electric Division. Philadelphia Electric has an experimental program underway, involving 360 of its customers, that will attempt to determine the rate structure that will induce the greatest shift in demand to off-peak periods by residential heating customers. West Penn Power is discussing residential load management rate structures with the Pa. PUC, while phasing out preferential rates for residential water heating and space heating. Atlantic Electric will base its consideration of time of day rate structures on the outcome of time of use studies conducted by Public Service Electric & Gas and Jersey Central Power & Light.

The current programs of both Baltimore Gas & Electric and Pa. Power & Light concentrate heavily on "energy management" (conservation). PP&L states that it has no current or proposed "demand management" (load management) program. However, it is involved in a multitude of ongoing research projects relating to wind and solar power, heat pumps, and thermal storage. Baltimore Gas & Electric does counsel new industrial and commercial customers on load factor improvement. The company also is testing systems of "storing cold" (building ice) during off-peak periods to be used for space cooling during on-peak hours.

GPU has presented a "Conservation and Load Management Master Plan" to the New Jersey and Pennsylvania regulatory commissions which is the most extensive proposal for future activities of any of the SREEUG companies. Basic to the Master Plan is the concept of "capacity offset". By this is meant that customer end-use equipment such as storage water heaters may be viewed as an alternative to new generating capacity. If the plan can be met, 1,000 MW of the projected 2,000 MW additional capacity needed by 1990 will be offset through a variety of means.

For the residential customer this may mean compulsory time of day rates, comprehensive energy audits, weatherization, and the supply by GPU of end-use equipment such as storage water heaters and storage space heaters to time of day customers. GPU would pay for all (or a portion) of the end-use equipment and the cost would be included in the rate base. The expected costs to GPU of the reduced capacity needs provided by storage water heaters is approximately $500 per kilowatt while the "capacity costs" of the storage space heating program is about $350 per kilowatt. By comparison the cost of new base load capacity for the same period (1980-90) is expected to rise from about $1,000 per KW to about $1,700 per KW.

No material regarding load management and conservation efforts was received from Delmarva Power & Light.

SUMMARY & CONCLUSIONS

The rapid escalation of fuel oil prices and the loss of the Three Mile Island generating capacity in 1979 are clearly evident throughout the statistics contained in this report. Energy production from combustion turbines and older oil-fired steam generation plants declined precipitously. Imports of energy into the basin increased tremendously. Seasonal peak loads in 1979 actually decreased from 1978 for seven of the SRBEUG companies. Energy use generally increased at lower than expected rates. Projected peak loads continued to be adjusted downward. (In 1979 the MAAC system projected its 1985 summer peak would be 40,426 MW. The 1980 projection was 38,600 MW.) In-service dates of new generating facilities have been delayed, and the margin of operable capacity over seasonal peak load remains substantial. (Projected summer margins for the PJM/MAAC interconnection, a strongly summer peaking system, are in the 24%-25% range for the period 1980-89.)

The ultimate fate of TMI Units 1 and 2 is not known at this time. Construction of the Susquehanna Steam Electric Station is well advanced. Aside from these two facilities, it is not likely that any major facilities will be constructed within the basin in the decade of the eighties. (A safe prediction based on the time required to plan, license and construct any major facility.) However, during the decade the Commission may be faced with requests for approval of coal-fired plants in the 600 MW to 800 MW capacity range as well as pumped storage and low head hydro facilities. In its deliberations the Commissioners may wish to address the following issues:

a) What has been the impact of the applicant's conservation and load management efforts to date? What are the prospects for the future?

b) As a matter of policy, does the Commission wish to encourage the construction of large facilities in remote areas, as opposed to several smaller facilities closer to the load centers where there may exist greater cogeneration potential?

c) What are the environmental impacts of a pumped-storage facility if the energy for the pumping phase is supplied by coal-fired plants?

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